We claim:

1. A high-frequency semiconductor device comprising:

an anetnna-ground plane provided above a semiconductor substrate, to be connected to the ground potential;

a patch electrode provied on said antenna-ground plane with an interlayer insulation film therebetween; and

an anetnna connection provided under said anetnna-ground plane and connected to said patch electrode via a through-hole formed passing through said anetnna-ground plane.

2. A high-frequency semiconductor device as set forth in claim 1, wherein said antenna connection is an antenna line of a patterned conductor.

3. A high-frequency semiconductor device as set forth in claim 1, wherein said antenna connection is an active region formed in said semiconductor substrate.

4. A high-frequency semiconductor device as set forth in claim 1, further comprising a line conductor provided above said semiconductor substrate, said line conductor forming a high-frequency transmission line together with the ground potential.

5. A high-frequency semiconductor device as set forth in claim 4, further comprising a ground plate which is provided above said semiconductor substrate and connected to the ground potential, wherein said line conductor forms a high-frequency transmission line together with said ground plate.

6. A high-frequency semiconductor device as set forth in claim 5, wherein said ground plate is provided under an antenna line as said antenna connection and said antenna line forms a high-frequency transmission line together with said ground plate.

7. A high-frequency semiconductor device as set forth in claim 1, further comprising a line conductor provided on said antenna-ground plane with an interlayer insulation film

therebetween, said line conductor forming a high-frequency transmission line together with said antenna-ground plane.

8. A high-frequency semiconductor device as set forth in claim 7, further comprising:

a ground plate provided above said semiconductor substrate, which is separated from said antenna-ground plane and is to be connected to ground potential; and

a line conductor provided on said ground plate with an interlayer insulation film therebetween, said line conductor forming a high-frequency transmission line together with said ground plate.

9. A high-frequency semiconductor device as set forth in claim 7, wherein said antenna-ground plane is provided on a substantially entire surface of said semiconductor substrate, and a plurality of said line conductors are provided on said antenna-ground plane, each of said plurality of line conductors forming a high-frequency transmission line together with said antenna-ground plane.

10. A high-frequency semiconductor device as set forth in claim 1, wherein a passive device is provided under said antenna-ground plane.

11. A high-frequency semiconductor device as set forth in claim 10, wherein said passive device is any one of line conductors, capacitors, inductors or resistors.

12. A high-frequency semiconductor device as set forth in claim 1, wherein said interlayer insulation film is composed of a resin insulating material.

13. A high-frequency semiconductor device as set forth in claim 12, wherein said resin insulating material is a polyimide or benzocyclobutane.

14. A high-frequency semiconductor device as set forth in claim 1, wherein said patch electrode has a rectangular shape or a circular shape.

95 cont. 15. A high-frequency semiconductor device as set forth in claim 1, wherein each of said patch electrode and antenna-ground plane is fomed of a high conductive material.

10 16. A high-frequency semiconductor device as set forth in claim 15, wherein said high conductive material is gold or a super conductor.